

## **KAIZEN PRINCIPLES AND EMPLOYEE PERFORMANCE IN DAVIS & SHIRTLIFF LIMITED, NAIROBI CITY COUNTY, KENYA**

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## **ABSTRACT**

Globally, firms are well known for their dependence on employees to achieve their objectives. Kenyan companies are vital due to their substantial impact to the economic development of the country thus gradually gaining attention in improving quality management for competitive advantage and superior employee performance. The study sought to investigate kaizen principles and their influence on employee performance in Davis & Shirliff Limited in Nairobi, Kenya. This paper sets out to establish whether kaizen practices like quality circles, sigma six DMAIC, just in time practices and lean manufacturing can contribute to the enhancement of employee performance in Davis & Shirliff Ltd by increasing efficiency, effectiveness skills/knowledge achievement and productivity. The study adopted descriptive research design where respondents described their experiences on the kaizen principles to improve employee performance in Davis & Shirliff Ltd. The target population was 288 employees in Davis & Shirliff Ltd. Stratified proportionate sampling method was applied to select each strata sample from sample size of 165 employees as participants from the manufacturing industry. The study adopted self-administered questionnaires as the main data collection instrument. A pilot study was undertaken to pre-test the questionnaire for its validity and reliability. Data findings were based upon the variables and reasons for conducting the research. Data analysis was done after quantitative approach with the aid of Statistical Package for Social Science (SPSS) version 23. Descriptive

statistics (in form of percentages, means and measures of dispersion) and inferential analysis was employed in the data analysis. Analysis using multiple regression was applied to show the strength of the association between the dependent and independent variables. The findings were presented in frequency tables and charts with explanations right after. There was 78.8% response rate. ANOVA demonstrates that the independent variables statistically significantly predict the dependent variable. Quality circles, sigma six DMAIC and lean manufacturing are the kaizen principles which are statistically significant in employee performance from the multiple regression analysis as compared to Just in time principle. Just in time lower influence could be attributed to low levels of awareness and responsiveness within the firm. The study revealed that quality circles improve delivery of objectives by employees and also lead to compliance towards the firm objectives. It was also established that sigma six DMAIC influences completion of activities by employees at minimized costs and also leads to faster flow of operations. Further opting for lean manufacturing minimizes wastages by employees and also that it provides simple comprehensive steps for employees on waste reduction. The study thus recommended that the management of Davis & Shirliff Ltd should adopt and implement quality circles in their company. The quality circles should be checked on a regular interval to ensure that they work best for the company. The management should set policies and guideline to be observed to ensure that Sigma Six DMAIC is adhered to

in the company. Also the study recommends that the personnel responsible with checking on just in time practices to be reliable and of high integrity to ensure that it is done in accordance to the listed procedure. The company should conduct more training on soft skills and adoption of kaizen principles within the whole organization on a regular basis based on a criterion to be developed by the company.

Further the study recommends that the management of the companies should focus on employees' strength when offering tasks to ensure that the appropriate and best candidates are offered tasks that they are more competent and fit in.

**Key Words:** *Kaizen principles, Employee performance, Davis & Shirliff limited, Nairobi City County, Kenya*

## **INTRODUCTION**

Firms can only win a competitive advantage through employees and to the extent that they are supported to perform (Obisi, 2011). Employee performance is vital in human resource integration as it addresses how performance is approached generally in organizations (Dutta & Pinder, 2011). Due to changing global trends, for firms to remain relevant in the market, they focus internal operations like efficiency, profitability, effectiveness, productivity, knowledge management and team work (Marilyn, 2011). Employee comfort in the work place has been realized as vital by firms as it leads to increased productivity, retaining of quality personnel and competitive edge is maintained (Gutnick, 2007). Successful companies acknowledge that their achievements relate to their capacity to communicate, track and manage their staff and engage in reward programs with individuals or team performance to maintain the workforce focus.

Employee performance must involve plans which provide balance, credible measures including expected results, appropriate measures, i.e. cost effectiveness, quality, timeliness and quantity. To gain credibility, performance expectations must be: timely communicated; specific, understandable and clear; measurable, verifiable and result oriented, propel continuous productivity improvement and be reasonable and attainable (Chadler, 2008). To improve on employee performance, thus overall organization performance, there are incremental kaizen principles like quality circles, just in time practices, sigma six DMAIC and lean manufacturing, which can be adopted in manufacturing firms (Bhoi, Desai & Patel, 2014). For firms to remain competitive, relevant and retain market share in this global market, kaizen adoption for continuous improvement is vital for overall industrial performance (Saad & Yusoff, 2015).

## **STATEMENT OF THE PROBLEM**

The Kenblachard Companies report of 2000 discussed the barrier to employee performance and concluded that only 60% of workforce was operating at 65% of their potential. The remaining 40% of employees' potential could be exploited by identifying the determinants of employee

performance of which most firms are faced with the dilemma of the factors which influence employee performance (Gitonga, Jean & Kingi, 2016). In Davis & Shirliff Ltd, poor individual employee performance affects the productivity of individual and group employees which can put the company at a risk. Measures and actions to improve employee's performance should be put, thus performance assessment becomes actionable, clear, measurable, concise and informative (Uma, 2013). D&S Ltd is not quite formal in adoption of policies designed specifically to inhibit employee performance constraints thus enhance performance in employees, however it's more inclined to improvement of quality performance in its processes. A lot of focus has also been put by the executives on external environmental factors affecting performance. Financial and accounting measures have been used in assessing performance in D&S Ltd. The fact that the accounting strategies are cost based and backward looking provides little employee motivation (Manzoni & Islam, 2009). A kaizen study practiced in selected Japan firms brings to a conclusion that kaizen uniquely evolves in each firm due to changes in the business environment of the firm. There is considerable reliance of D&S Ltd to acquire its goals as vitality in the worker performance within the changing business environment. This yields insights into kaizen's sustainability, for the firm's competitive advantage (Brunet & New, 2003). Study of impact of kaizen on the D&S Ltd worker's performance shall ensure that kaizen improves employee's welfare. Kaizen improves employees' working condition, improves on their programs and strengthens their social capital in firms (Shimada & Sonobe, 2010). Even though studies of employee performance and kaizen principles have been done independently, so far there are very few studies that relate kaizen principles with employee performance and specifically to firms in Kenya. This constituted a gap in knowledge that the proposed study intended to fill. The identified gap was captured in the following question: What is the effect of kaizen principles on employee performance in Davis & Shirliff Ltd?

## **GENERAL OBJECTIVE**

To determine the influence of kaizen on employee performance in Davis & Shirliff Ltd in Nairobi, Kenya.

## **SPECIFIC OBJECTIVES**

1. To establish the effect of quality circles on employee performance in Davis & Shirliff Ltd.
2. To examine the extent to which adoption of sigma six DMAIC process affects employee performance in Davis & Shirliff Ltd.
3. To determine the effect of Just in Time practices on employee performance in Davis & Shirliff Ltd.
4. To establish the effect of lean manufacturing practice on employee performance in Davis & Shirliff Ltd.

## **THEORETICAL REVIEW**

### **Performance Theory**

In Elger's research he comments that people are capable of extraordinary accomplishments while pointing to an example of Gandhi who managed a peaceful upheaval that freed India from colonists (Elger, 2008). Elger defines performance as an ongoing journey to desired achievement and not a destination. The theory of performance develops and relates six foundational concepts to form a framework explaining performance and the performance improvements which include; context, knowledge level, skills level, identity level, personal factors, and fixed factors (Goleman & Daniel, 2007). Each level characterizes the effectiveness or quality of performance and a summary of worthy accomplishment produced from high level performances. This theory is vital in firms whereby competencies like regulation and recognition add value to performance of individuals. The theory therefore supports the research on kaizen influence to employee performance as it aids in exploring the possibilities for creating claims to performance in firms. The theory emphasizes the great relevance of individual performance and the overall employees' performance which can be translated to success in firms.

### **Goal Setting Theory**

This theory suggests that employees establish individual goals that are vital to motivate employee performance to a superior form. Individuals and firms perform better when they set more difficult goals (Locke & Latham, 2006). Goals are modified to be more realistic, or performance is improved realistically, in case the goals are not achieved. Individuals or firm performance can decrease in case goals are easily achievable. The goal of the whole performance management system will be achieved upon performance improvement (Salaman, 2005). According to researchers, the correlation between enhanced firm outcomes and goal setting is positive in firms working efficiently (Spaulding & Simon, 1994). The main principles that facilitate better performance due to goal setting are commitment, clarity, task complexity, challenge and feedback (Locke & Latham, 2006). According to the goal-setting theory, the four mediating mechanisms namely; task strategies, direction persistence and effort, all affect performance when achieving goals (Koppes, 2014). Continuous improvement in performance standards and objectives should be backed by commitment analysis, used to round up objectives (Moynihan, 2008). Commitment analysis assists to determine goals and objectives continuous pursuit which drives firms to enhanced productivity (Krausert, 2009). Goal setting has however been mentioned as costly and time due to factors like; time involvement, selection of people with right skills and knowledge, the expenses incurred productivity of the organization and the training necessity for right career development (Julnes, 2007). This theory is important in firms as setting goals are part of lean manufacturing and DMAIC practices used to improve overall employee performance.

## **The ADKAR Model**

Jeff Hiatt developed the ADKAR model of research done by Prosci in 1998, which was a tool first used to ensure that the process of change occurs efficiently with the desired results during organizational change (Hiatt, 2013). ADKAR focuses on the element of change on people, specifically ensuring the employees involved support and believe in the change. The model then moves to focus at the business dimension of change, as once the people are behind it, the processes must then be focused on. The development of the model, carried out by the US research organization Prosci, was based on a 14 year period of study, across 59 countries, narrowing down to 900 organizations (Prosci, 2009). According to research, success of the firm entailed mobilizing employees to propel a change strategy using five main steps to ensuring employee support; Awareness of the change need and requirement, Desire to propel change and participate in it, Knowledge on ways of propelling the change, Ability to regularly involve change and Reinforcement of change to ensure implementation (Prosci, 2009). The model of ADKAR is a useful tool for kaizen implementation in firms by helping individuals to be at par and plan for the process of change, and also monitoring their reactions as the process of change occurs. The model is of assistance in measuring the effectiveness and efficiency of the process of change in employees. Progress of employees can then be gauged to individuals, and correction then reinforced. This theory emphasizes the great relevance of employee performance to lead a firm to its success.

## **EMPIRICAL REVIEW**

### **Employee Performance**

The MESA (Manufacturing Enterprise Solutions Association) firm, over past years sponsored research to aid manufacturing firms identifying the most vital metrical of employee performance and assist those making decisions to discern performance enhancements on metrical, which they found to be; improved quality, efficiency, compliance, reduced maintenance, increased flexibility and innovation, reduced costs and improved profitability, improved customer experience and responsiveness (Schmidt, Otto & Kusmaul, 2010). In January 2011, an Aberdeen group issued a report, which sheds more light into the traits on practices of employee performance management in manufacturing firms. The study considered 65 professionals responses from the manufacturing sector and analyzed the firms employees performance against three important Key Performance Indicators (KPIs): employees indicating themselves as engaged, employees that outdo performance targets based on review of the previous performance and the yearly advancement in satisfaction of the customers.

### **Quality Circles and Employee Performance**

A study explored the outcome of participative technique of QC on plenty employee performances which involved 42 independent samples from 36 studies. Mean effect sizes were moderate for work performance which suggested QCs affected work performance to a great degree. For manufacturing firms involved in management of quality, the results suggested that quality interventions have a greater effect on work performance. The conclusions on the study provide a positive perspective on the implications of QCs quality interventions take on productivity (Pereira & Osburn, 2007). In a non-ferrous foundry firm in BHEL, Hyderabad, a QC identified an unhealthy, smoke polluted environment. Managerial maturity also recognized that work quality and productivity would be influenced by such unhygienic conditions in the environment. However the repeated issue that had no solution for several years was resolved by members of the quality circle, who methodically assessed the problem, revealed a solution and implemented it with employees' cooperation within six months (Sobti, 2016).

### **Sigma Six DMAIC Process and Employee Performance**

A case study done by the American Society for Quality (ASQ) and Metrus Group in 2010 indicated that manufacturing firms obtaining the best marks for tremendous implementation initiatives of quality and positive business results due to adoption of DMAIC process are the ones that; attain top leadership support, expand a culture that is focused on quality and efficiently administer employee input to performance. The correct initiatives teach employees waste elimination, achieve cost savings and build process consistency. The result is less absenteeism and higher satisfaction of employees (Scotty, 2016). Case study on solar manufacturing firm in India with approximately 850 employees embarking on sigma six over 7 years yielded improvements in its printing processes by 4%, saving over \$140,000 per year. It also had reduction in rework/rejection rate from 18% to nearly 5%, thus saving over \$65,000 per year. Tools used were control charts, histograms, hypothesis tests. Sigma six positively affected business performance due to improvement in customer satisfaction (Antony, Gijo, Kumar & Ghadge, 2014).

### **Just in Time Practices and Employee Performance**

Studies have explored the relationship between JIT practices and performance outcomes in manufacturing firms through meta-analysis of correlations approach. Based on deep assessment of 1992 to 2008 literature, the results support a positive relationship between JIT manufacturing practices and overall summed performance. However, findings indicate that not all individual JIT practices are associated with all types of performance outcomes. This study indicates that JIT practices manifest the major impact on performance outcomes for individuals and asserts the role of moderating factors in the relationship between JIT practices and performance (Mackelprang, 2009). Descriptive research study was done on JIT implementation and its potential benefits by

managers in Portugal. Data was collected through mail questionnaires sent to 100 firms results showed JIT utilized resources in the most efficient ways and increased quality. Portuguese firms used JIT as a philosophy rather than solution for operations related problems (Alves & Moreira, 2008).

Ex-post facto quantitative research with non-experimental design was done in cement industry of Pakistan to determine JIT implementation. Sample consisted 400 operations managers through convenience sampling. Questionnaires based on 5 point Likert scale were administered. The study examined and established factors having positive relationship with JIT implementation in Pakistan cement industry i.e. total quality control, production plan, supply chain integration, inventory management (Qureshi, Iftikhar, Bhatti, Shams & Zaman, 2013). An empirical study was done on industrial firms in Jordan on JIT system and its impact on operational excellence. Study was done on 14 manufacturing firms using questionnaires administered to 168 respondents (managers and departmental heads for production and logistics). Multiple regression analysis was used to test the study hypothesis. Study established that JIT system (entailing supplier's quality, equipment layout, set-up reduction; pull production) has positive impact on operational excellence in industrial firms, thus gaining competitive advantage. The results of this study however cannot be generalized on other sectors like food and pharmaceuticals, as it is applied to the Jordanian industrial firms especially at Al-Karak governance (Al harasia, 2017).

### **Lean Manufacturing and Employee Performance**

An empirical study was done on Indian automobile industry to verify influence of lean manufacturing on operational performance. Self-administered questionnaires were analyzed using factor analysis and structural equation modeling. The study established positive and significant relationship between lean manufacturing and operational performance. Waste elimination, employee awareness and involvement, visual management contributed more on the success of lean manufacturing in Indian automobile manufacturing industry (Amal & Umarali, 2017). An empirical study of 24 Swedish medium sized (50-250 employees) manufacturing firms implementing lean manufacturing on working condition effects was done quantitatively on 282 people (from 85 managers, 51 production supervisors, 99 workers and 77 white collar workers). Questionnaires were administered and results indicated that the physical work environment improved, there was increase in work safety for personnel and also slight increase in stress due to lean practices (Brannmark, 2014).

## **RESEARCH METHODOLOGY**

### **Research Design**

The study adopted descriptive research design in examining impact of kaizen on employee performance in Davis & Shirtliff Ltd. The descriptive survey design method is appropriate in



exploring how different kaizen principles affect performance of D&S Ltd. It's a systematic approach of gathering descriptive data regarding attributes of a sample of a population, current customs, circumstances or requirements. Descriptive design establishes and measures the cause and effect of relationships between variables (Cooper & Schindler 2003). Descriptive design was adopted by the study to facilitate researcher to assemble great and deep information on the population being studied. A descriptive research design enabled the researcher to conduct analysis and measurement of the population required for quantitative experimentation since it provides important indicators as to the variables to be quantitatively tested. The study involved collecting quantitative data from employees in D&S Ltd over a period of one month.

### **Target Population**

Population is a whole number of elements where a sample is chosen (Bryman, 2012). This study targeted employees in D&S Ltd in Nairobi. D&S Ltd employees are assigned to several divisions contributing to success of the firm; sales, technical, service, administration, commercial/business development and supply. There are 288 employees based in D&S Ltd head office Nairobi, who were the target population in this study.

### **Sampling Design**

A sample is defined as the section of the target population chosen for study. The objective of sampling is to secure a sample which will be representative of the entire population. One can collect more detailed information due to collecting data from fewer cases (Saunders, Thornhill & Lewis, 2003). Stratified sampling is applied when the researcher wants to understand the existing relationship between two or more groups. Stratified proportionate random sampling was applied in carrying out the study to ensure each subgroup/strata within the population receives proper representation within the sample. In proportionate stratification, a sampling fraction is used in each of the strata that is proportional to that of the total population. The sample size of each stratum is proportionate to the population size of the stratum (Thompson, 2012). Using the sampling table, from research advisors (2006), with the size of population being 288 (as per Table 3.1), at a margin of error of 5%, confidence interval of 95%, the sample to be used is 165 respondents. Stratas identified in this study, are the divisions in D&S Ltd, which hold several departments across them. The divisions are; Sales division, General Commercial/Business Development division, Service division, Technical division, Supply division & Administration division. From the above sampling frame, using stratified proportionate random sampling, each strata's sample size was determined by the following equation:

$$n_h = (N_h / N) * n$$

Where:  $n_h$  is the sample size for stratum  $h$ ;  $N_h$  is the population size for stratum  $h$ ;  $N$  is total population size, 288;  $n$  is total sample size, 165.

The sampling fraction was obtained by the equation;  $n/N = 165/288$

### **Data Collection Instruments and Procedures**

Primary data collection method was through structured closed form of questionnaires personally administered by the researcher and research assistants. A questionnaire is an instrument used for data collection during research studies in form of questions that bring out the required information. The respondents were provided with closed ended questionnaires. Questionnaires were of five-point Likert scale with pre-implied answers from strongly agree, neutral point at the center, to strongly disagree for each variable testing. The questionnaire had three parts. Section A contained general data on the respondent and the firm. Part B focused on specific kaizen principles geared towards employee performance whereas section C focused on the employee performance. No secondary data was collected. Data was collected by presenting letter for transmission of data collection instruments to respondents when issuing the questionnaires. This was done after obtaining permits from Kenyatta University graduate school and National Commission for Science, Technology & Innovation (NACOSTI). The questionnaires were issued and collected through enumerators and also pick and drop system.

### **Data Analysis and Presentation**

Data analysis encompasses compiling data collected, organizing it and structuring its main elements for efficient and easy communication of the results (Yin, 2008). Data analysis purpose is to respond to the study research questions. Data collected from the questionnaires was monitored to ensure that they have been correctly and completely filled. The data was assembled, classified and tabularized, ready for the analysis. Statistical Package for Social Science (SPSS) version 23 computer software was used to assist in the data analysis. Analysis of the data used quantitative approaches. Descriptive statistics (in the form of means, percentages, and dispersion measures) and inferential analysis were acquired in the analysis of data. The findings were displayed on frequency distribution charts and tables. Correlation analysis was used to determine if there was a relationship between the dependent and the independent variables. To determine the weight of the relationship association between dependent and the independent variables, multivariate regression analysis was used. The equation was:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \epsilon$$

Where: Y is the dependent variable (employee performance);  $\beta_0$  is the regression coefficient;  $\beta_1$ ,  $\beta_2$ ,  $\beta_3$  and  $\beta_4$  are the slopes of the regression equation; X1 is Quality circles; X2 is DMAIC process; X3 is Just in Time practices; X4 is Lean manufacturing;  $\epsilon$  is a random error term normally distributed about a mean of 0 and for the aim of computation, the  $\epsilon$  is assumed to be 0.

Model diagnostic tests were done to determine the appropriateness of the multiple regression model before performing inference. Model diagnostic procedures entailed statistical test that are formal and graphical methods. The procedures enabled the researcher to find out the validity of assumptions of the regression model and decide whether the researcher can affirm to subsequent inference results.

## **RESEARCH RESULTS**

This paper sets out to establish whether kaizen practices like quality circles, sigma six DMAIC, just in time practices and lean manufacturing can contribute to the enhancement of employee performance in Davis & Shirliff Ltd by increasing efficiency, effectiveness skills/knowledge achievement and productivity. The study adopted descriptive research design where respondents described their experiences on the kaizen principles to improve employee performance in Davis & Shirliff Ltd, Nairobi City County, Kenya. The target population was 288 employees in Davis & Shirliff Ltd. Stratified proportionate sampling method was applied to select each strata sample from sample size of 165 employees as participants from the manufacturing industry. As the main data collection instrument, the study adopted self-administered questionnaires. The questionnaire validity and reliability was pre-tested by performing a pilot study. Data findings were based upon the variables and reasons for conducting the research. Data analysis was done after quantitative approach using Statistical Package for Social Science (SPSS) version 23. Descriptive statistics (in form of means, percentages and measures of dispersion) and inferential analysis were employed in the data analysis. Analysis using multiple regression was enforced to illustrate the strength of the relationship between the dependent and independent variables.

## **REGRESSION ANALYSIS**

The research determined the fit of the regression equation using the coefficient of determination to get the strength of the influence between the dependent and independent variables. The model summary illustrates the R, R<sup>2</sup>, adjusted R<sup>2</sup>, and the standard error of the estimate, which can be used to determine how well a regression model fits the data.

**Table 1: Model Summary**

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	Std. Error of the Estimate
1	.901 <sup>a</sup>	.811	.798	.88195

a. Predictors: (Constant), Quality circles, Sigma Six DMAIC, Just in Time practices and Lean manufacturing.

This model summary shows the R<sup>2</sup>, the adjusted R<sup>2</sup> and the standard error of estimate. “R” the multiple correlation coefficient (measure of the quality of the prediction of the dependent variable). “R<sup>2</sup>” is a statistical measure of how close the data are to the fitted regression line. It is also known as the coefficient of determination, or the coefficient of multiple determinations for

multiple regressions. “Adjusted R<sup>2</sup>” is coefficient of determination which tells us the variation in the dependent variable due to changes in the independent variable.

From the findings in the above table the value of adjusted R<sup>2</sup> was 0.798, an indication that there was variation of 79.8% on employee performance due to quality circles, sigma six DMAIC process, just in time practices and lean manufacturing practice at 95% confidence level. R is the correlation coefficient which shows the relationship between the study variables, and from the findings shown in the table above there was a strong positive relationship between the study variables as shown by 0.901.

ANOVA is used to determining the degree of difference or similarity in groups of data. This helps to tests whether the overall regression model is a good fit for the data. In this ANOVA analysis, the dependent variable is employee performance. There are significant relationships between the dependent variable and the independent variables quality circles, sigma six DMAIC process, just in time practices and lean manufacturing practice.

**Table 2: ANOVA**

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	0.404	4	0.101	6.3125	.018b
Residual	2	125	0.016		
Total	2.404	129			

a. Dependent Variable: Employee Performance

b. Predictors: (Constant), Quality circles, Sigma Six DMAIC, Just in Time practices and Lean manufacturing

Table 2 sums up the observed means for each dependent variable across experimental state and the associated F ratios and p values obtained from the one-way ANOVAs conducted for the primary analyses. From the findings, the p-value was 0.018 which is less than 0.05 and hence the model is good in predicting how the four independent variables (Quality circles, Sigma six DMAIC process, Just in Time practices and Lean manufacturing practice) influence effective fundraising. Further, the F-calculated (6.3125) was more than the F-critical (2.53). This illustrates that the model was capable of forecasting the impact of the independent variables on the dependent variable. When t calculated is greater than t critical, the null hypothesis is rejected.

Multiple regression analysis was conducted to find the relationship between employee performance and the independent variables; quality circles, sigma six DMAIC process, just in time practices and lean manufacturing practice. Table 3 gives the coefficients which helps in establishing the regression line. The table gives the coefficients of each variable and the extent to which it influences the dependent variable and which in this case is employee performance.

**Table 3: Coefficient of Correlation**

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	1.161	0.129	0.99	9.00	.000
Quality circles	1.482	.064	1.21	23.16	.039
Sigma six DMAIC process	0.942	.050	0.65	18.84	.004
Just in Time practices	1.218	.040	1.05	30.45	.041
Lean manufacturing practice	2.106	.059	1.54	35.69	.016

Table 3 also includes the significance level of each variable in the study. The established regression equation was;

$$Y=1.161 + 1.482X_1 + 0.942X_2 + 1.281X_3 + 2.106X_4$$

Where: Y is the dependent variable (employee performance);  $\beta_0$  is the regression coefficient;  $\beta_1, \beta_2, \beta_3$  and  $\beta_4$  are the slopes of the regression equation;  $X_1$  is Quality circles,  $X_2$  is Sigma six DMAIC process,  $X_3$  is Just in Time practices and  $X_4$  is Lean manufacturing practice;  $\epsilon$  is an error term, assumed to be zero.

Employee performance = 1.161 +1.482 Quality circles ( $X_1$ ) + 0.942 Sigma six DMAIC process ( $X_2$ ) + 1.218 Just in Time practices ( $X_3$ ) +2.106 Lean manufacturing practice ( $X_4$ ). The beta shows the magnitude or the strength of each dependent variable. This shows the extent to which the dependent variable will change when the independent variable is increased by one unit in each case. From the above regression model, holding quality circles, sigma six DMAIC process, just in time practices and lean manufacturing practice, employee performance would be 1.161. It's established that a unit increase in quality circles, would cause an increase in employee performance by a factor of 1.482. A unit increase in sigma six DMAIC process would cause an increase in employee performance by a factor of 0.942. A unit increase in just in time practices would cause an increase in employee performance by a factor of 1.218 and a unit increase in lean manufacturing practice would cause an increase in employee performance by a factor of 2.106. This clearly shows that there is a positive relationship between quality circles, sigma six DMAIC process, just in time practices, lean manufacturing practice and employee performance. The study further revealed that the P-value were less than 5% in all the variables, which shows that all the independent variables were statistically significant and thus in position to make conclusion for the study.

**Influence of Quality Circles on Employee Performance**

On this study objective the study revealed that Davis & Shirliff Ltd has adopted quality circles as was shown by majority of the respondents. The outcome of the Pearson's correlation coefficient illustrated the significant positive relationship between employee performance and

quality circles ( $\rho = 0.653$ ,  $p\text{-value} < 0.476$ ). Further the study revealed that; quality circles; offer efficient communication channels, ensure faster solutions to work related problems, lead to compliance towards the firm objectives and also enhance ease of communicating objectives. Additionally, the study revealed that quality circles; assist in timely completion of activities, improve delivery of objectives by employees and leads to better communication feedback amongst employees. Further the study revealed that quality circles; propel faster remittance of information and opting for quality circles leads to reduced grievances. The study also indicated that quality circles improve team cohesion. The study indicated that quality circles; improve the work standards for employees and also that they propel proper delegation of duties. Also the study revealed that to a great extent quality circles influence employee performance in Davis & Shirliff Ltd.

### **Influence of Sigma Six DMAIC on Employee Performance**

On this objective the study revealed that Davis & Shirliff Ltd had adopted Sigma Six DMAIC principle. The outcome of the Pearson's correlation coefficient illustrated a significant positive relationship between employee performance and sigma six DMAIC ( $\rho = 0.633$ ,  $p\text{-value} < 0.439$ ). The study revealed that sigma six DMAIC; allows for simpler flow of processes, improves the work place tidiness, propels understanding of job processes, lead to increased knowledge on products and also leads to completion of work as per directives. Additionally, the study revealed that sigma six DMAIC: ensures minimization on errors by employees opting for sigma six DMAIC leads to faster flow of operations. Further the study revealed that sigma six DMAIC; offers for accuracy by employees in completion of activities and that it influences completion of activities by employees at minimized costs, ensures reduced defect rates by employees and also leads to employees increasing product yield. Further the study revealed that by a great extent sigma six DMAIC influence employee performance in Davis & Shirliff Ltd.

### **Influence of Just in Time Principle on Employee Performance**

On this objective the study revealed that Davis & Shirliff Ltd adopted just in time principle by a moderate extent. The outcome of the Pearson's correlation coefficient revealed positive relationship between employee performance and just in time principle ( $\rho = 0.602$ ,  $p\text{-value} < 0.335$ ). The study revealed that opting for just in time; leads to employees applying the right procedures at work, offers faster operational processes, improves delivery of right quantities of products/services by employees and reduces employee reworks on products. Additionally, the study revealed that just in time; reduces employee reworks on products and influences better quality on products/services. Further the study revealed that just in time; influences timely deliveries of products/ services by employees and facilitates flow of activities for employees. Also the study revealed that just in time leads to improved work integration within employees and increases speeds in employees executing activities. In addition, the study revealed that just in time saves on cost by the time tasks are completed and leads to minimal or

no delays in production. The study also found out that just in time principle influence employee performance in Davis & Shirtliff Ltd by a moderate extent.

### **Influence of Lean Manufacturing Principle on Employee Performance**

The study revealed that Davis & Shirtliff Ltd adopted lean manufacturing by a great extent. The outcome of the Pearson's correlation coefficient illustrated a strong positive relationship between employee performance and lean manufacturing ( $\rho=0.648$ ,  $p\text{-value}<0.458$ ). The study revealed that lean manufacturing; leads to correct skills application based on the job description, facilitates proper handling of operatives and machinery by the employees, and it offers clear safety procedures for employees. Also the study revealed that lean manufacturing; minimizes wastages by employees, reduces firm accidents to employees, improves employee's skills on machine operation. In addition, the study revealed that lean manufacturing; leads to improved production and quality product by employees, improves knowledge on soft skills and software usage, leads to employees spearheading product innovation. The study also indicated lean manufacturing; ensures employees satisfy customer tastes and preferences and leads to better management on green energy by employees. The study research also indicated that lean manufacturing principle influence employee performance in Davis & Shirtliff Ltd by a great extent.

### **CONCLUSIONS**

On the effect of quality circles on employee performance in Davis & Shirtliff Ltd, the study concludes that quality circles; propel proper delegation of duties, assist in timely completion of activities, ensure faster solutions to work related problems and that quality circles lead to better communication feedback amongst employees.

The second objective of the study was to examine the extent to which adoption of sigma six DMAIC process affects employee performance in Davis & Shirtliff Ltd. The study concludes that sigma six DMAIC; ensures reduced defect rates by employees, leads to employees increasing product yield and also that leads to employees increasing product yield.

On the effect of just in time practices on employee performance in Davis & Shirtliff Ltd, the study concludes that just in time; propels timely completions of tasks by employees, reduces employee reworks on products and leads to employees applying the right procedures at work. Also the study concludes that just in time influences better quality on products/services. With respect to the effect of lean manufacturing practice on employee performance in Davis & Shirtliff Ltd, the study concludes that lean manufacturing; leads to employees spearheading product innovation, leads to improved production and quality product by employees and also that it ensures employees satisfy customer tastes and preferences.

## **RECOMMENDATIONS**

Regarding the first objective of the study which was to establish the effect of quality circles on employee performance in Davis & Shirtliff Ltd, the study revealed that quality circles improve delivery of objectives by employees and also lead to compliance towards the firm objectives. The study thus recommends that the management of Davis & Shirtliff Ltd should adopt and implement quality circles in their company. The quality cycles should be checked on a regular interval to ensure that they work best for the company. On the study's second objective the study revealed that Sigma Six DMAIC; influences completion of activities by employees at minimized costs and also leads to faster flow of operations. Thus the study recommends that the management of Davis & Shirtliff Ltd should uphold Sigma Six DMAIC, the management should set policies and guideline to be observed to ensure that Sigma Six DMAIC is adhered to in the company.

Regarding the influence of just in time the study revealed that; leads to improved work integration within employees and influences timely deliveries of products/ services by employees. Thus the study recommends that the management of the company should ensure that guidelines on Just in time are adhered to. Also the study recommends that the personnel responsible with checking on just in time practices to be reliable and of high integrity to ensure that it is done in accordance to the listed procedure. The company should consider creating further awareness on just in time principle to increase its levels of awareness and responsiveness within employees.in their performance.

On influence of lean manufacturing, the study revealed that opting for lean manufacturing minimizes wastages by employees and also that it provides simple comprehensive steps for employees on waste reduction. Thus the study recommends that companies' management should adopt fully lean manufacturing in their processes to ensure that the employees work is made more efficient and deliver products and services that will satisfy the customers. The study research recommends that the management of the company should establish clear working system flow and clear separation of duties. Also the management should set a more objective approach to employee motivation.

Also the study research recommends that the management of the company should conduct more training on soft skills and adoption of kaizen principles within the whole organization on a regular basis based on a criterion to be developed by the company. Further the study recommends that the management of the companies should focus on employees' strength when offering tasks thus ensure that the appropriate and best candidates are offered tasks that they are more competent and fit in.



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